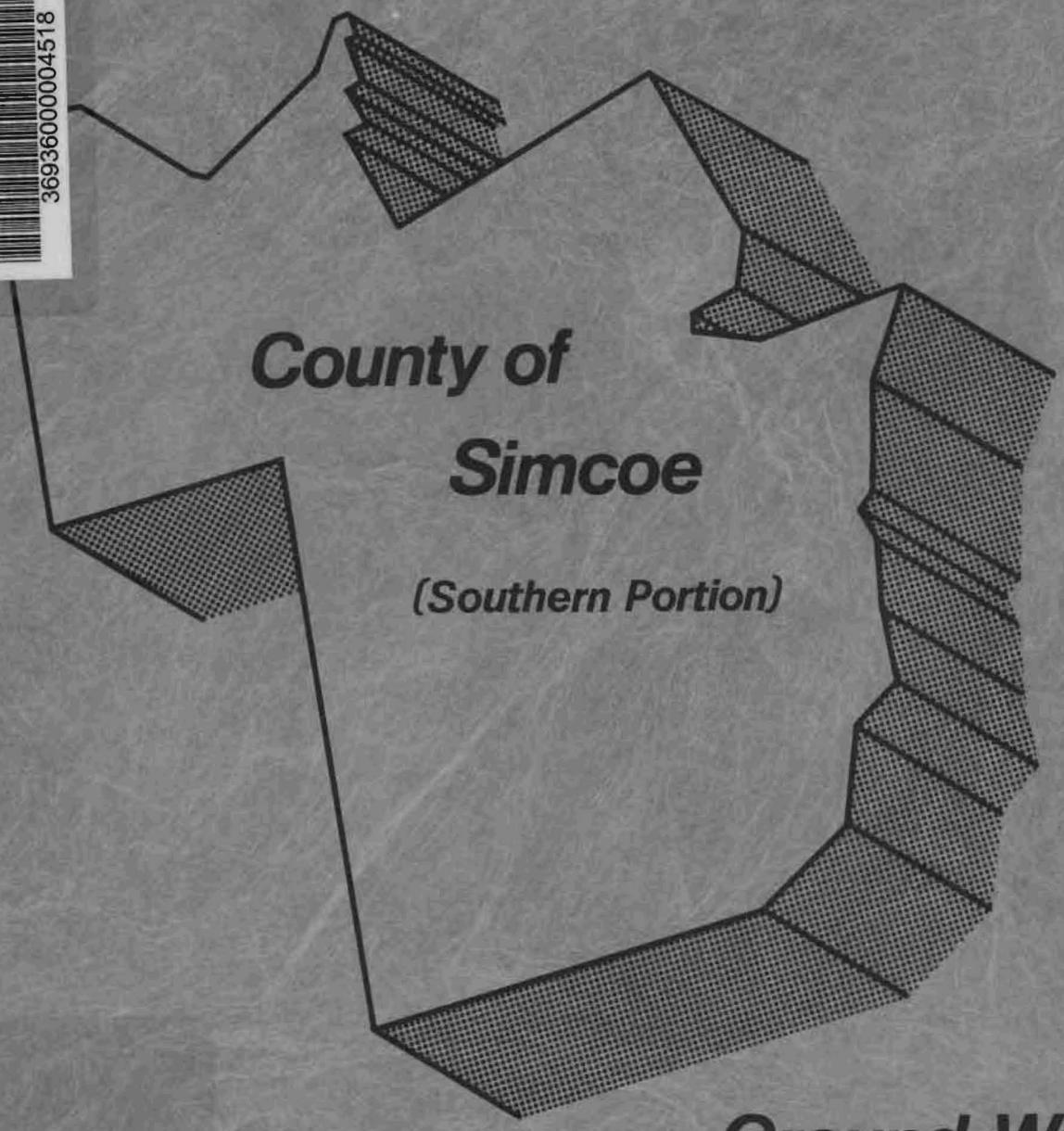
Ontario

Ministry of the Environment

Hon. Keith C. Norton, Q. C., *Minister*
G. J. M. Raymond, *Deputy Minister*

Water Resources Branch
Hydrology and Monitoring Section

Water Resources Map 3135



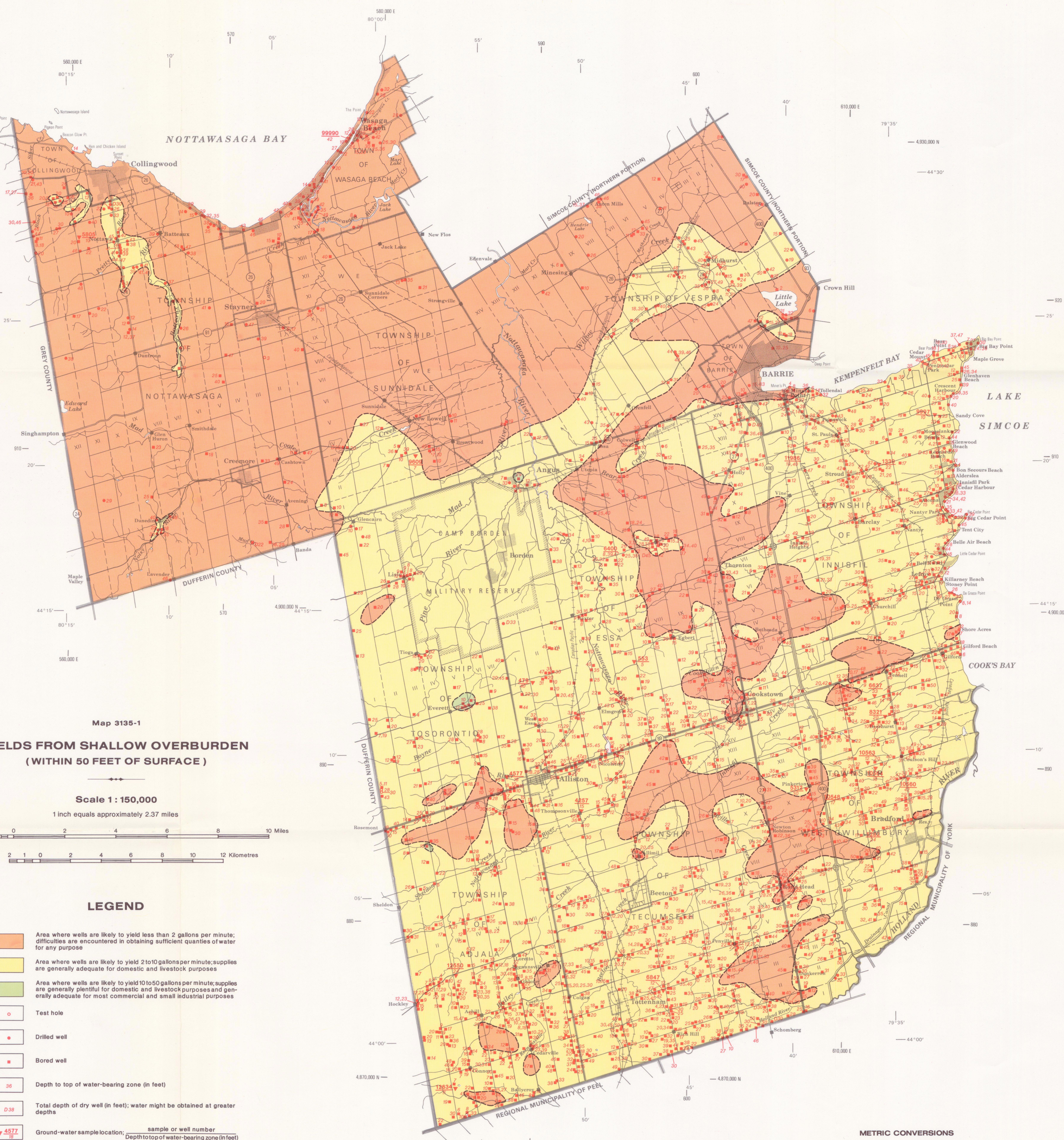
County of Simcoe

(Southern Portion)

Ground Water Probability

by
M. E. Turner

1981



Map 3135-1

YIELDS FROM SHALLOW OVERBURDEN
(WITHIN 50 FEET OF SURFACE)

Scale 1 : 150,000

1 inch equals approximately 2.37 miles

LEGEND

- Area where wells are likely to yield less than 2 gallons per minute; difficulties are encountered in obtaining sufficient quanties of water for any purpose
- Area where wells are likely to yield 2 to 10 gallons per minute; supplies are generally adequate for domestic and livestock purposes
- Area where wells are likely to yield 10 to 50 gallons per minute; supplies are generally plentiful for domestic and livestock purposes and generally adequate for most commercial and small industrial purposes
- Test hole
- Drilled well
- Bored well
- 36 — Depth to top of water-bearing zone (in feet)
- D 38 — Total depth of dry well (in feet); water might be obtained at greater depths
- 4577/18 — Ground-water sample location; sample or well number / Depth to top of water-bearing zone (in feet)

NOTES:

1. Water-sample analyses are shown in Table 1 Sheet 4
2. Individual well yields may differ from yields indicated for an area
3. Only representative wells have been plotted in areas of high well densities
4. In recreational areas such as Wasaga Beach, many wells are completed as sand points. No distinction has been made here between sand points and drilled wells

METRIC CONVERSIONS

1 foot	=	0.305 metres
1 mile	=	1.609 kilometres
1 gallon	=	4.546 litres
1 gallon per minute	=	7.576×10^{-2} litres per second

MOE 2217

DESCRIPTIVE NOTES

In this publication, ground-water availability on a regional scale is indicated in terms of probable quantities of water available, depths at which water is commonly found, and water quality at sampled locations. Because of the complexity of ground-water occurrence, the foregoing information is presented on four map sheets:

Sheet 1: Supplies in Shallow Overburden
Sheet 2: Supplies in Deep Overburden
Sheet 3: Supplies in Bedrock
Sheet 4: Water Quality

Hydrogeologic interpretations are based on data obtained from approximately 8,000 water-well records on file with the Ontario Ministry of the Environment and from past documented studies of ground-water availability. The appropriate references are listed on each map sheet. Reliability of the interpretations varies throughout the region and a periodic up-dating or revision of the present interpretations may be necessary as new hydrogeologic information becomes available.

It is important to note that the interpreted probable well yields may not everywhere represent yields available to all wells because of variations in local hydrogeology, type of well construction, and in the reliability of available data. However, the indicated yields are thought to be good approximations in most areas. In cases where reliable, long-term yields are sought, it is necessary to undertake detailed hydrogeologic investigations and pumping tests.

ASSESSING WATER REQUIREMENTS

In order to evaluate well yields, the amount of water required from a prospective well should first be estimated. To estimate the approximate domestic and livestock daily water requirements, multiply the number of users (people and animals) by the appropriate figure in the table below. If desired, an additional 20 to 30% can be added to the total to account for increased demand in the future. While individual residential needs are difficult to estimate, most homes with water-consuming items such as washing machines will average about 100 gallons per day per person.

It is important to take into account the water demand during peak periods of usage in order that the well does not run dry temporarily. This demand can be estimated by counting the number of fixtures and water outlets in the house which will be used at one time, and multiplying by the flow rate for each. Tables showing the flow rate per fixture can be obtained from water-supply equipment dealers.

Approximate Daily Water Requirements

each member of the family (kitchen, laundry, bath)	50-150 gallons per day
for each producing milk cow (incl. washing)	35 gallons per day
for each dry cow	15 gallons per day
for each steer, horse	12 gallons per day
for each hog	4 gallons per day
for each sheep	2 gallons per day
for each 100 chickens	6 gallons per day
for each 100 turkeys	12 gallons per day

Note: — table modified from F. R. Hore, Farm Water Supply, Ontario Department of Agriculture and Food, Publication 476

For information on irrigation requirements, contact your Regional Office of the Ontario Ministry of Agriculture and Food.

EVALUATION OF PROSPECTIVE WELL SITES

By using the maps in this publication along with the following step-by-step procedure, prospective well sites can be evaluated in terms of probable yields, likely depths to water-bearing zones, and likely quality of water at each site. Subsequently, this information can be used in other considerations such as: possible water treatment, pump type and size, well cost, and type of well construction (a table illustrating the different types of well construction and their applications is appended).

The maps should be used in the suggested sequence in order to obtain the most economic wells. Map 3135-1 indicates yields from the shallowest formations and should be consulted first. Progressively deeper and more costly wells will have to be constructed as water is sought from deeper formations in order to obtain the yields indicated on maps 3135-3 and 3135-5.

Evaluation Procedure

To evaluate yields:

1. locate the well site on Map 3135-1 of Sheet 1 (Yields from Shallow Overburden);
2. note the colour of the map at the well site;
3. refer to the legend and relate the colour to the appropriate probable yield;
4. if the probable yield does not meet your water requirements, repeat steps one through three using Map 3135-3 on Sheet 2 (Yields from Deep Overburden). Similarily, if probable yields determined from Map 3135-3 are insufficient, repeat the same steps using Map 3135-5 on Sheet 3 (Yields from Bedrock).

To evaluate the depths to water-bearing zones:

5. If Map 3135-1 was selected in the above steps, water-bearing zones occur at depths easily reached by shallow dug and bored wells and sand points; if Map 3135-3 was selected, locate the well site on Map 3135-4 and note the depth to the water-bearing zones by using the legend; if Map 3135-5 was selected, locate the well site on Map 3135-6 and note the depths to the water-bearing zones by using the legend;
6. exact depths to water-bearing zones for individual wells are shown on maps 3135-1, 3135-3 and 3135-5.

To evaluate water quality:

7. to evaluate the likely ground-water quality at a potential well site, locate the well on the selected yield map and note the nearby ground-water sampling points. Chemical analyses of these samples are found in the Inorganic Chemical Analyses tables 1, 2, and 3 on Sheet 4. To interpret the significance of the analyses, refer to Table 4 on Sheet 4.

A COMPARISON OF DIFFERENT WELL TYPES AND THEIR APPLICATIONS

WELL TYPE	SUITABLE GEOLOGIC MATERIALS	ADVANTAGES	DISADVANTAGES
DUG WELLS	OVERBURDEN both low- and high-yielding materials (gravel, sand, silt, clay)	• Does not require special machinery to construct • Large diameter provides reservoir storage; augments low yields • Can be constructed in areas of limited access	• Labour intensive to construct • Depth is limited because of caving • Well failure is common during dry periods because of usually shallow depths
BORED WELLS	OVERBURDEN both low- and high-yielding materials (gravel, sand, silt, clay)	• Efficient method of constructing large-diameter wells • Large diameter provides reservoir storage; augments low yields	• Depth is usually limited because of well-drilling equipment limitations and very hard earth materials
DRILLED WELLS	OVERBURDEN AND BEDROCK moderate to high-yielding materials (sand, gravel, sandstone, limestone)	• Can reach deeper depths than other techniques • Can penetrate bedrock	• Generally small-diameter wells with little reservoir storage capacity
DRIVEN OR JETTED WELLS (Sand Points)	OVERBURDEN moderate to high-yielding materials (sand and gravel)	• Simple installation: can be done by hand or machine • A number of these wells can be hooked into one water-supply system	• Small diameter provides little reservoir storage • Depth is limited; depends on tightness of overburden

YIELDS FROM SHALLOW OVERBURDEN – SUMMARY

In the northern portion of the map area, shallow overburden wells yielding less than 2 gallons per minute are found in extensive areas of surficial till deposits and in the clay plains of glacial Lake Algonquin. Wells yielding less than 2 gallons per minute are also found in the sand plain at Wasaga Beach on Nottawasaga Bay where the high-density usage of sand points causes interference problems and limits the overall production capability of individual wells. Wells in buried alluvial deposits south of Collingwood on Nottawasaga Bay yield 2-10 gallons per minute as do wells found in the Lake Algonquin sand plain between Angus in the central part of the study area and Midhurst to the northeast and between Angus and Alliston to the south. Surficial glacio-fluvial and ice-contact sands and gravels in the Township of Adjala in the south-western corner of the map also yield 2-10 gallons per minute. West of Lake Simcoe, in the Township of Innisfil, and in the areas of Bradford, Bondhead and Schomberg in the southeastern corner of the map area, confined sands at depths of 30-40 feet yield 2-10 gallons per minute.

SOURCES OF INFORMATION

Burwasser, G. J., 1974; Geology of the Collingwood-Nottawasaga area, southern Ontario; Ontario Division of Mines, Preliminary Map P.919, Geological Series.

Burwasser, G. J. and Boyd, S. T., 1974; Geology of the Orr Lake (western half) — Nottawasaga area, (eastern half), southern Ontario; Ontario Division of Mines, Preliminary Map. P.975, Geological Series.

Burwasser, G. J. and Cairns, B. D., 1974 ; Geology of the Barrie area (western half), southern Ontario; Ontario Division of Mines, Preliminary Map, P.978, Geological Series.

Cowan, W. R., 1976; Geology of the Orangeville area, southern Ontario; Ontario Division of Mines, Geoscience Report 141.

Deane, R. E., 1950; Pleistocene Geology of the Lake Simcoe District, Ontario; Geological Survey of Canada, Memoir 256.

Gwyn, Q. H. J., and White, S., 1973; Geology of the Alliston area, southern Ontario; Ontario Division of Mines, Preliminary Map P.835, Geological Series.

Ontario Department of Energy and Resources Management, 1964; Nottawasaga Valley Conservation Report; Conservation Authorities Branch.

——————————, 1966; Holland Valley Conservation Report — Water; Conservation Authorities Branch.

Sibul, U., and Choo-Ying, A. V., 1971; Water resources of the Upper Nottawasaga River drainage basin; Ontario Water Resources Commission, Division of Water Resources, Water Resources Report 3.

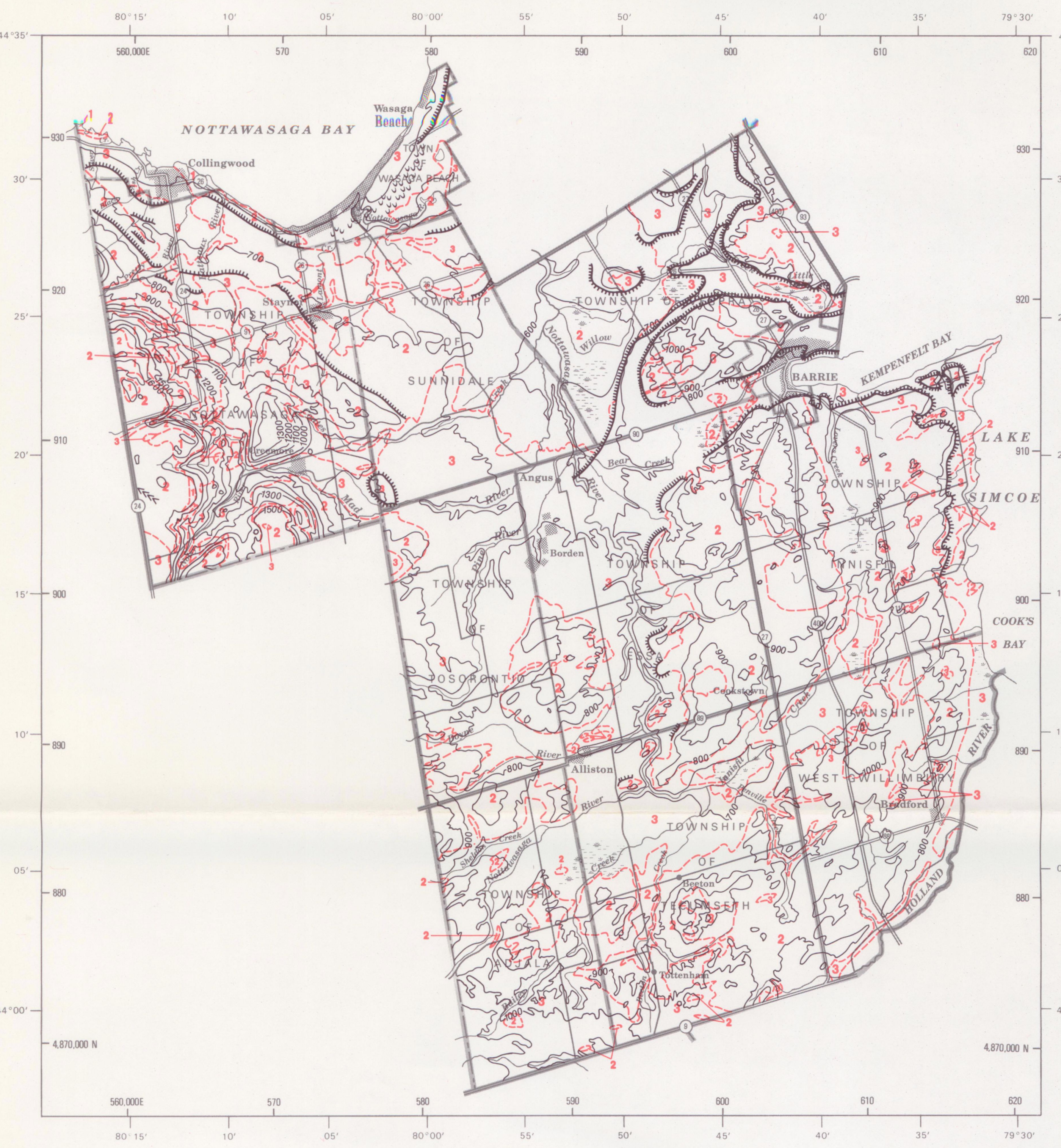
White, O. L., 1975; Geology of the Bolton area, southern Ontario; Ontario Division of Mines, Geological Report 117.

Geological information was derived from water-well records on file with the Ontario Ministry of the Environment up to January 1978.

Map Compilation and interpretation by M. E. Turner, 1979.

Cartography by H. De Souza.

Base maps derived from 1:50,000 map sheets of the National Topographic series.



Map 3135-2

PERMEABILITY OF SURFICIAL MATERIALS

Scale 1 : 300,000

1 inch equals approximately 4.73 miles

LEGEND

- 3 — Permeable materials, sand and/or gravel
- 2 — Impermeable materials, clay, silt, till
- 1 — Bedrock
- Surface-elevation contour (100 foot interval)
- Esker
- Dune field
- Abandoned shore bluff
- Swamp

NOTE:

This map is based on surficial geology maps published by the Ontario Division of Mines and the Geological Survey of Canada.

MOE 2218

Ontario
MINISTRY OF THE ENVIRONMENT
Water Resources Branch

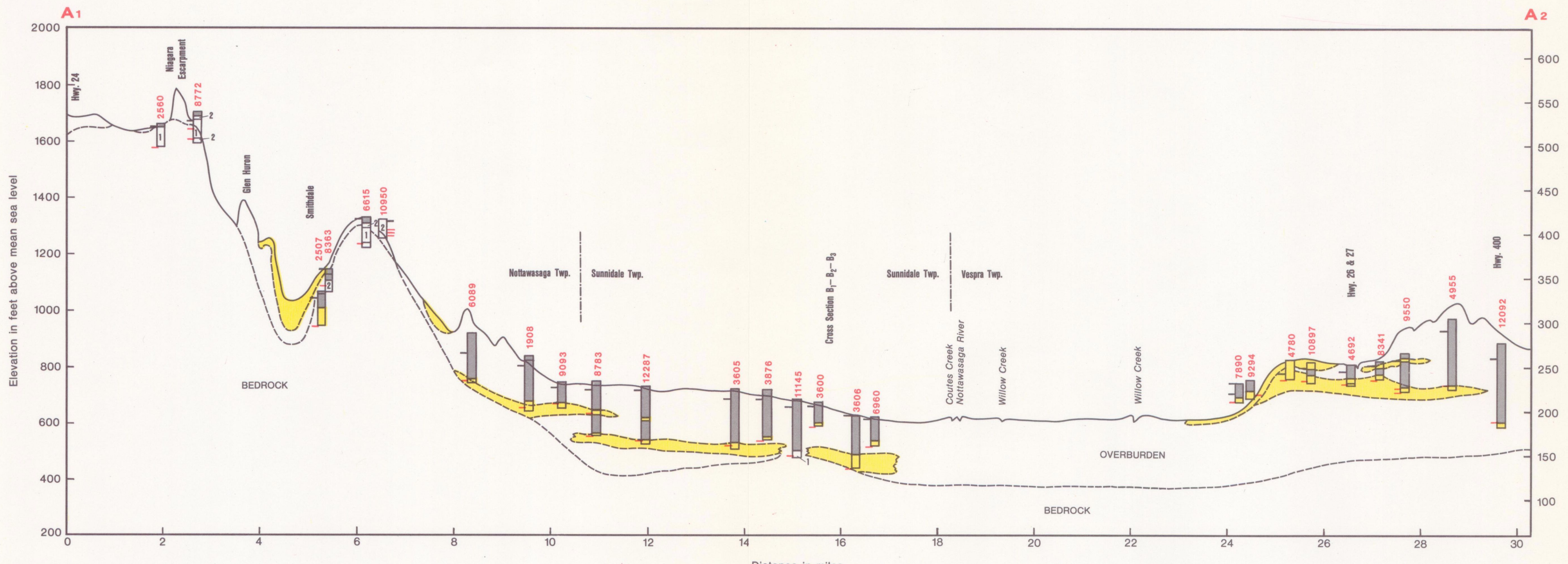
COUNTY OF SIMCOE (Southern Portion)

Map 3135

GROUND-WATER PROBABILITY

SHEET 1

WATER SUPPLIES IN SHALLOW OVERBURDEN
(WITHIN 50 FEET OF SURFACE)



CROSS SECTION A1 – A2

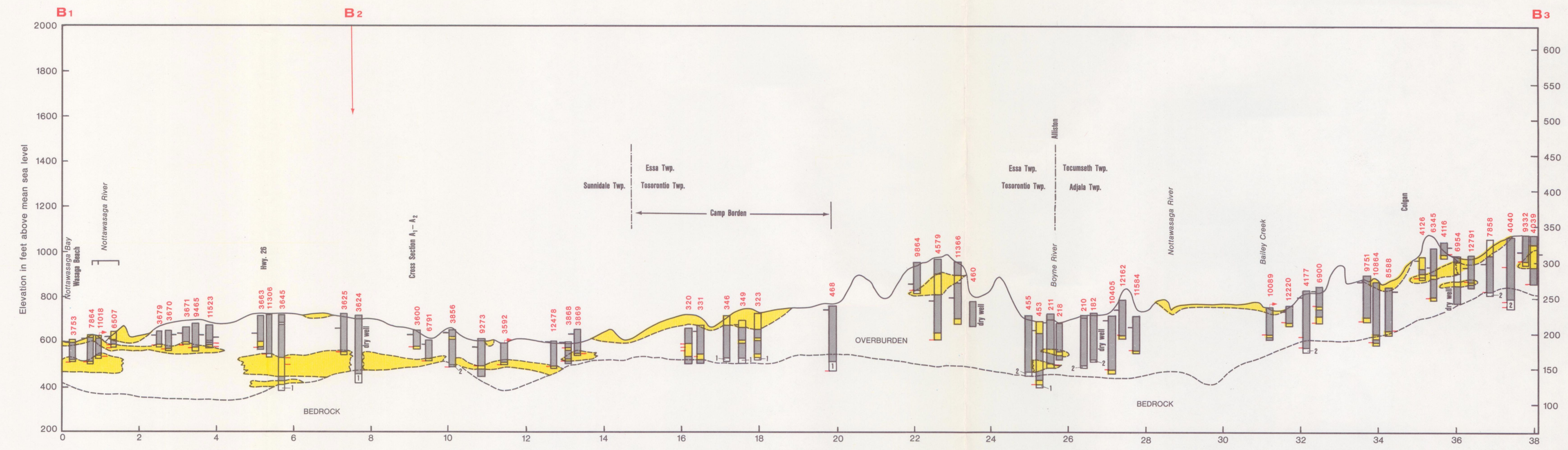
LEGEND FOR CROSS SECTIONS

- Overburden with high permeability and therefore, good water yielding capacity from saturated zones; primarily sands and/or gravels; this classification does not infer a homogeneous geological unit but includes sands and gravels of different origins and physicial characteristics; some fine sands with good water-yielding capacities are included in this classification; materials, where found at surface, may not be water-bearing
- Overburden with low permeability and therefore poor water-yielding capacity; clay, silt, very fine sand, clay and stones are included in this classification
- 1 Limestone
- 2 Shale
- Water well
- Location of static water level
- Location of top of water-bearing zone
- Flowing well
- 4955 Water-well number

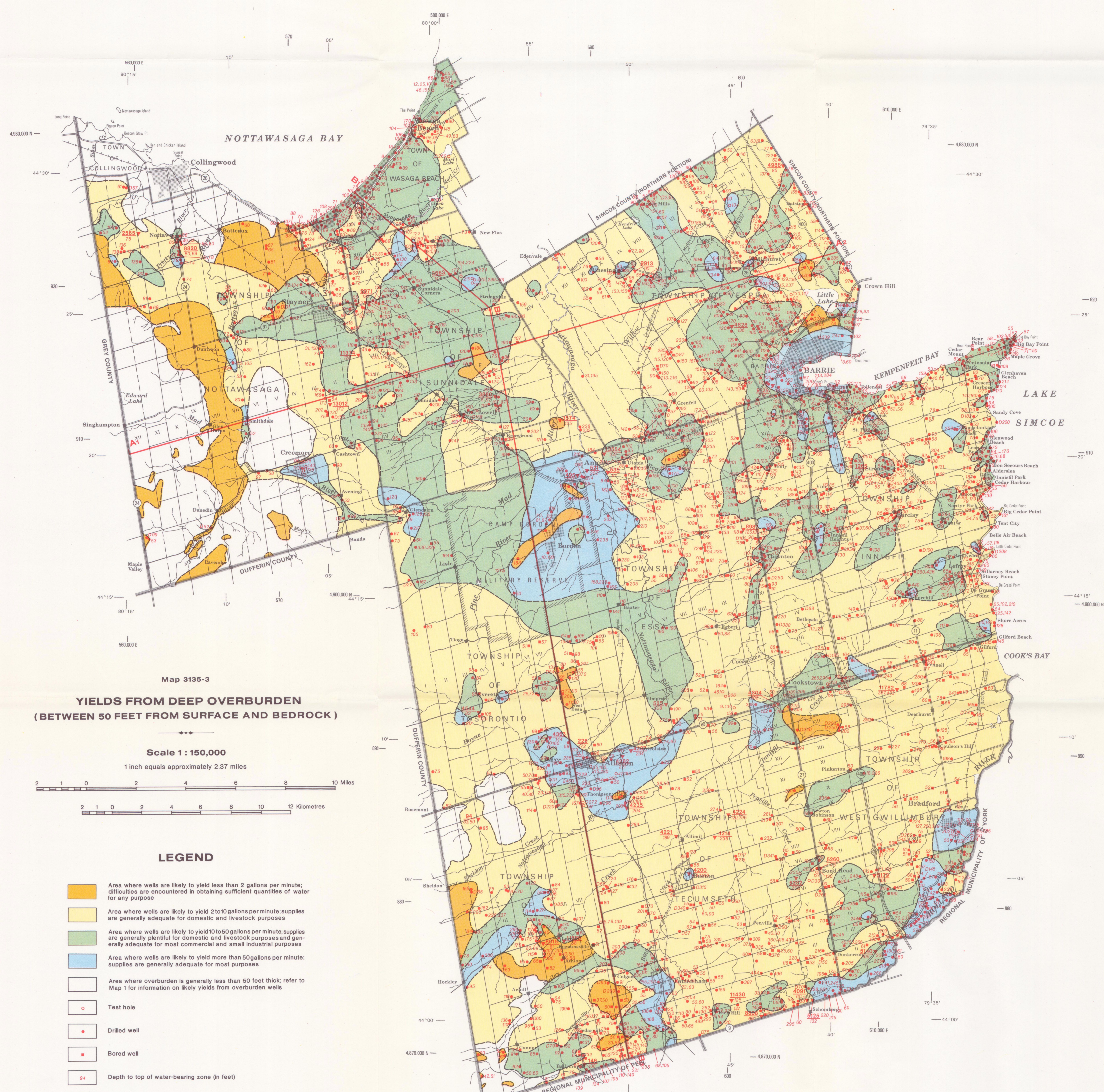
Horizontal Scale 1:150,000
Vertical Scale 1:1,200

NOTES:

1. Wells shown above or below ground level have been projected onto the line of cross section.
2. Location of cross sections shown on Map 3135-3



CROSS SECTION B1 – B2 – B3



Map 3135-3

YIELDS FROM DEEP OVERBURDEN
(BETWEEN 50 FEET FROM SURFACE AND BEDROCK)

Scale 1 : 150,000

1 inch equals approximately 2.37 miles

2 1 0 2 4 6 8 10 Miles

2 1 0 2 4 6 8 10 12 Kilometres

LEGEND

- Area where wells are likely to yield less than 2 gallons per minute; difficulties are encountered in obtaining sufficient quantities of water for any purpose
- Area where wells are likely to yield 2 to 10 gallons per minute; supplies are generally adequate for domestic and livestock purposes
- Area where wells are likely to yield 10 to 50 gallons per minute; supplies are generally plentiful for domestic and livestock purposes and generally adequate for most commercial and small industrial purposes
- Area where wells are likely to yield more than 50 gallons per minute; supplies are generally adequate for most purposes
- Area where overburden is generally less than 50 feet thick; refer to Map 1 for information on likely yields from overburden wells
- Test hole
- Drilled well
- Bored well
- 94 Depth to top of water-bearing zone (in feet)
- D195 Total depth of dry well (in feet); water might be obtained at greater depths
- 4544/83 Ground-water sample location; sample or well number / Depth to top of water-bearing zone (in feet)
- A1 A2 Line of cross section

NOTES:

1. Water-sample analyses are shown in Table 2 Sheet 4
2. Individual well yields may differ from yields indicated for an area
3. Only representative wells have been plotted in areas of high well densities

METRIC CONVERSIONS

1 foot	=	0.305 metres
1 mile	=	1.609 kilometres
1 gallon	=	4.546 litres
1 gallon per minute	=	7.576×10^{-2} litres per second

MOE 2219

DESCRIPTIVE NOTES

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5. If Map 3135-1 was selected in the above steps, water-bearing zones occur at depths easily reached by shallow dug and bored wells and sand points; if Map 3135-3 was selected, locate the well site on Map 3135-4 and note the depth to the water-bearing zones by using the legend; if Map 3135-5 was selected, locate the well site on Map 3135-6 and note the depths to the water-bearing zones by using the legend;
6. exact depths to water-bearing zones for individual wells are shown on maps 3135-1, 3135-3 and 3135-5.

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BORED WELLS	OVERBURDEN both low- and high-yielding materials (gravel, sand, silt, clay)	• Efficient method of constructing large-diameter wells • Large diameter provides reservoir storage; augments low yields	• Depth is usually limited because of well-drilling equipment limitations and very hard earth materials
DRILLED WELLS	OVERBURDEN AND BEDROCK moderate to high-yielding materials (sand, gravel, sandstone, limestone)	• Can reach deeper depths than other techniques • Can penetrate bedrock	• Generally small-diameter wells with little reservoir storage capacity
DRIVEN OR JETTED WELLS (Sand Points)	OVERBURDEN moderate to high-yielding materials (sand and gravel)	• Simple installation: can be done by hand or machine • A number of these wells can be hooked into one water-supply system	• Small diameter provides little reservoir storage • Depth is limited; depends on tightness of overburden

YIELDS FROM DEEP OVERBURDEN – SUMMARY

Areas where deep overburden wells yield less than 2 gallons per minute are found in the northwestern part of the map area along the Niagara Escarpment in the Township of Nottawasaga where the overburden is thin and does not contain a significant water-bearing zone. Yields of 10-50 and over 50 gallons per minute generally are found where wells penetrate high yielding aquifers such as at Barrie and Bradford in the eastern part of the map area or the Alliston Aquifer Complex, which underlies most of the study area.

SOURCES OF INFORMATION

Burwasser, G. J., 1974; Quaternary Geology of the Collingwood-Nottawasaga area, southern Ontario; Ontario Division of Mines, Preliminary Map P.919, Geological Series.

Burwasser, G. J. and Boyd, S. T., 1974; Quaternary Geology of the Orr Lake area (western half)—Nottawasaga area (eastern half), southern Ontario; Ontario Division of Mines, Preliminary Map P.975, Geological Series.

Burwasser, G. J. and Cairns, B. D., 1974; Quaternary Geology of the Barrie area (western half), southern Ontario; Ontario Division of Mines, Preliminary Map P.978, Geological Series.

Cowan, W. R., 1976; Quaternary Geology of the Orangeville area, southern Ontario; Ontario Division of Mines, Geological Report 141.

Deane, R. E., 1950; Pleistocene Geology of the Lake Simcoe District, Ontario; Geological Survey of Canada, Memoir 256.

Gwyn, Q. H. J., 1972; Quaternary Geology of the Dundalk area, southern Ontario; Ontario Department of Mines and Northern Affairs, Preliminary Map P.727, Geological Series.

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Yakutchik, T. J., 1958; unpublished report, Ground-water survey for the Village of Stayner; Ontario Water Resources Commission, Division of Water Resource files.

————, 1963; unpublished report, Ground-water survey for the Police Village of Angus; Ontario Water Resources Commission, Division of Water Resource files.

Geologic information was derived from water-well records on file with the Ontario Ministry of the Environment up to January 1978.

Map compilation and interpretation by M. E. Turner, 1979.
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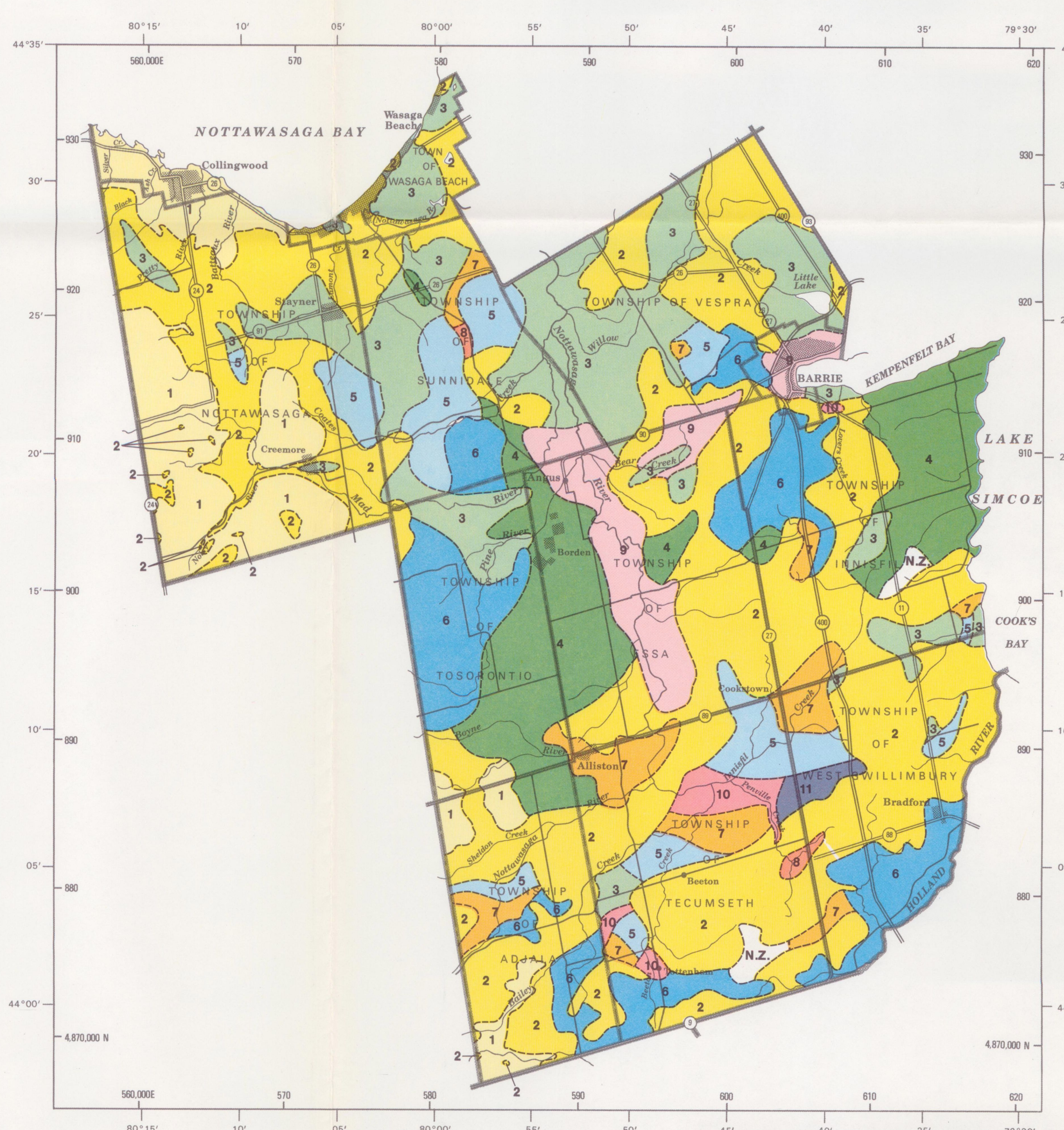
Base maps derived from 1:50,000 map sheets of the National Topographic series.



Map 3135-4

DEPTHS TO WATER-BEARING ZONES IN DEEP OVERBURDEN
(Between 50 feet from surface and bedrock)

Scale 1 : 300,000

1 inch equals approximately 4.73 miles

5 0 5 10 Miles

5 0 5 10 15 Kilometres

LEGEND

- 1 Area in which most overburden wells obtain water within 50 feet of ground surface
- 2 Area in which most overburden wells obtain water between 51 and 100 feet below ground surface
- 3 Area in which most overburden wells obtain water between 101 and 150 feet below ground surface
- 4 Area in which most overburden wells obtain water between 51 and 100 feet and between 101 and 150 feet below ground surface
- 5 Area in which most overburden wells obtain water between 151 and 200 feet below ground surface
- 6 Area in which most overburden wells obtain water between 101 and 150 feet and between 151 and 200 feet below ground surface
- 7 Area in which most overburden wells obtain water between 201 and 250 feet below ground surface
- 8 Area in which most overburden wells obtain water between 101 and 150 feet and between 201 and 250 feet below ground surface
- 9 Area in which most overburden wells obtain water between 151 and 200 feet and between 201 and 250 feet below ground surface
- 10 Area in which most overburden wells obtain water between 251 and 300 feet below ground surface
- 11 Area in which most overburden wells obtain water between 301 and 350 feet below ground surface
- N.Z. Area in which there are no significant water-bearing zones within deep overburden; for the purposes of this map, water-bearing zones are defined as those zones yielding more than 2 gallons per minute

NOTE:
Base data for this map are indicated on Map 3135-3

MOE 2220

Ontario
MINISTRY OF THE ENVIRONMENT
Water Resources Branch

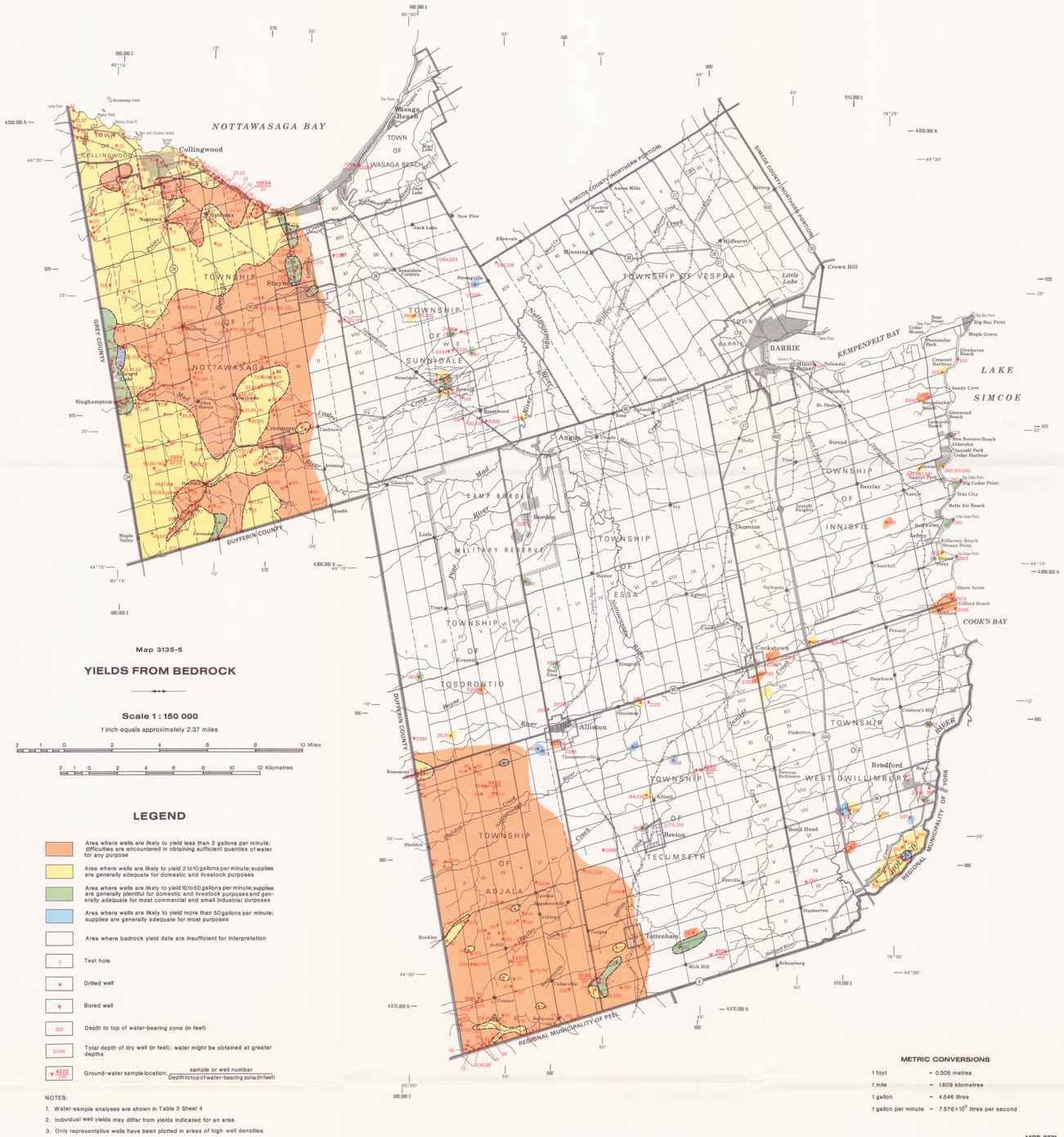
COUNTY OF SIMCOE
(Southern Portion)

Map 3135

GROUND-WATER PROBABILITY

SHEET 2

WATER SUPPLIES IN DEEP OVERBURDEN
(BETWEEN 50 FEET FROM SURFACE AND BEDROCK)



Map 3135-5

YIELDS FROM BEDROCK

Scale 1 : 150 000

1 inch equals approximately 2.37 miles

2 1 0 2 4 6 8 10 Miles

2 1 0 2 4 6 8 10 12 Kilometres

LEGEND

- Area where wells are likely to yield less than 2 gallons per minute; difficulties are encountered in obtaining sufficient quantities of water for any purpose
- Area where wells are likely to yield 2 to 10 gallons per minute; supplies are generally adequate for domestic and livestock purposes
- Area where wells are likely to yield 10 to 50 gallons per minute; supplies are generally plentiful for domestic and livestock purposes and generally adequate for most commercial and small industrial purposes
- Area where wells are likely to yield more than 50 gallons per minute; supplies are generally adequate for most purposes
- Area where bedrock yield data are insufficient for interpretation
- 9 — Test hole
- Drilled well
- Bored well
- 302 — Depth to top of water-bearing zone (in feet)
- D246 — Total depth of dry well (in feet); water might be obtained at greater depths
- ▼ 4232 / 245 — Ground-water sample location: sample or well number / Depth to top of water-bearing zone (in feet)

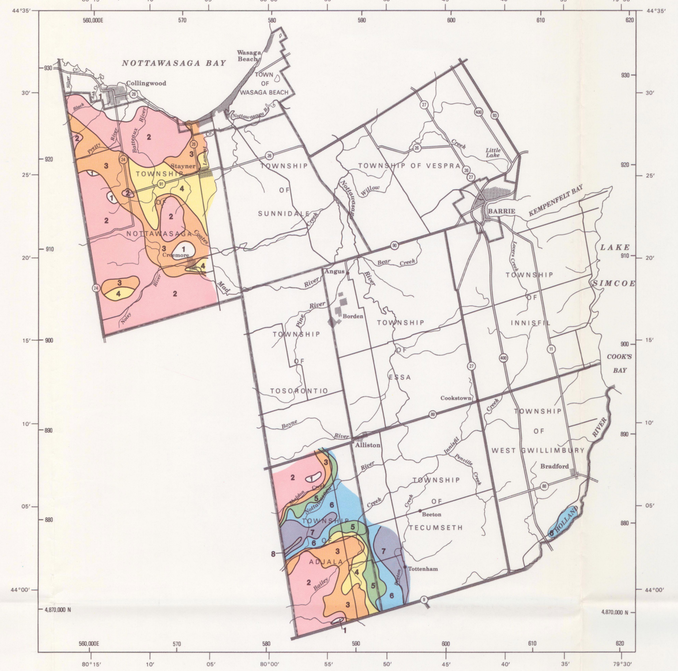
NOTES:

1. Water-sample analyses are shown in Table 3 Sheet 4
2. Individual well yields may differ from yields indicated for an area.
3. Only representative wells have been plotted in areas of high well densities.

METRIC CONVERSIONS

1 foot	=	0.305 metres
1 mile	=	1.609 kilometres
1 gallon	=	4.546 litres
1 gallon per minute	=	7.576×10^{5} litres per second

MOE 2221



Map 3135-6

DEPTHS TO WATER-BEARING ZONES IN BEDROCK

Scale 1 : 300 000

1 inch equals approximately 4.73 miles

5 0 5 10 Miles

5 0 5 10 15 Kilometres

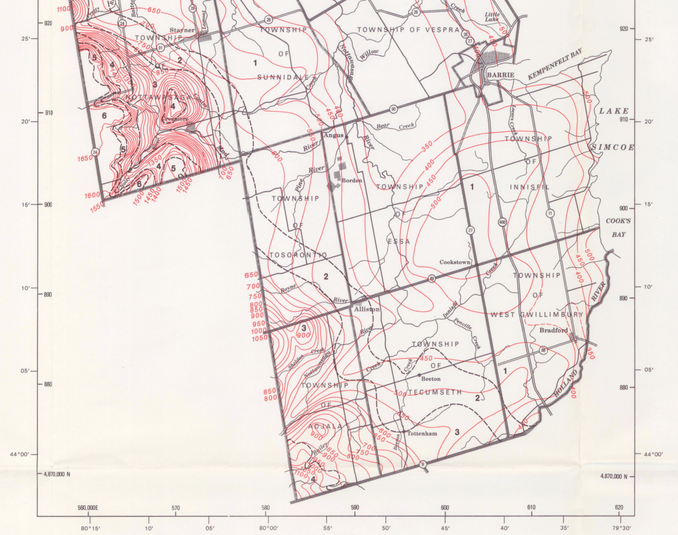
LEGEND

- 1 — Area in which most bedrock wells obtain water within 50 feet of ground surface
- 2 — Area in which most bedrock wells obtain water between 51 and 100 feet below ground surface
- 3 — Area in which most bedrock wells obtain water between 101 and 150 feet below ground surface
- 4 — Area in which most bedrock wells obtain water between 151 and 200 feet below ground surface
- 5 — Area in which most bedrock wells obtain water between 201 and 250 feet below ground surface
- 6 — Area in which most bedrock wells obtain water between 251 and 300 feet below ground surface
- 7 — Area in which most bedrock wells obtain water between 301 and 400 feet below ground surface
- 8 — Area in which most bedrock wells obtain water between 401 and 500 feet below ground surface
- Area in which depths to water-bearing zones in bedrock data are insufficient for interpretation

NOTE:

Base data for this map are indicated on Map 3135-5.

MOE 2222



Map 3135-7

BEDROCK LITHOLOGY AND TOPOGRAPHY

Scale 1 : 300 000

1 inch equals approximately 4.73 miles

5 0 5 10 Miles

5 0 5 10 15 Kilometres

LEGEND

PALEOZOIC

SILURIAN

6	Dolomite, grey	Amabel Formation
5	Dolomite, brown, grey	Fossil Hill Formation
	Shale, red, green, grey	CATARACT GROUP
	Dolomite, grey	Cabot Head Formation
	Sandstone, light grey	Manitoulin Formation
		Whirlpool Formation

ORDOVICIAN

4	Shale, soft, red	Queenston Formation
3	Shale, limestone, dolomite interbedded	Georgian Bay Formation
2	Shale, grey, blue, brown, black	Whitby Formation
1	Limestone, grey, argillaceous	SIMCOE GROUP
	Limestone, shale, interbedded	Lindsay Formation
	Limestone, brown, grey	Verulam Formation
		Bobcaygeon Formation

- Geologic boundary approximate
- 750 — Bedrock surface–elevation contour, interval 50 feet (all elevations in feet above mean sea level)

NOTES:

1. Bedrock geology after Liberty (1969)
2. Location of bedrock topography control points are shown on Map 3135-5

MOE 2223

DESCRIPTIVE NOTES

In this publication, ground-water availability on a regional scale is indicated in terms of probable quantities of water available, depths at which water is commonly found, and water quality at sampled locations. Because of the complexity of ground-water occurrence, the foregoing information is presented on four map sheets:

Sheet 1: Supplies in Shallow Overburden
Sheet 2: Supplies in Deep Overburden
Sheet 3: Supplies in Bedrock
Sheet 4: Water Quality

Hydrogeologic interpretations are based on data obtained from approximately 8,000 water-well records on file with the Ontario Ministry of the Environment and from past documented studies of ground-water availability. The appropriate references are listed on each map sheet. Reliability of the interpretations varies throughout the region and a periodic up-dating or revision of the present interpretations may be necessary as new hydrogeologic information becomes available.

It is important to note that the interpreted probable well yields may not everywhere represent yields available to all wells because of variations in local hydrogeology, type of well construction, and in the reliability of available data. However, the indicated yields are thought to be good approximations in most areas. In cases where reliable, long-term yields are sought, it is necessary to undertake detailed hydrogeologic investigations and pumping tests.

ASSESSING WATER REQUIREMENTS

In order to evaluate well yields, the amount of water required from a prospective well should first be estimated. To estimate the approximate domestic and livestock daily water requirements, multiply the number of users (people and animals) by the appropriate figure in the table below. If desired, an additional 20 to 30% can be added to the total to account for increased demand in the future. While individual residential needs are difficult to estimate, most homes with water-consuming items such as washing machines will average about 100 gallons per day per person.

It is important to take into account the water demand during peak periods of usage in order that the well does not run dry temporarily. This demand can be estimated by counting the number of fixtures and water outlets in the house which will be used at one time, and multiplying by the flow rate for each. Tables showing the flow rate per fixture can be obtained from water-supply equipment dealers.

Approximate Daily Water Requirements

each member of the family (kitchen, laundry, bath)	50-150 gallons per day
for each producing milk cow (incl. washing)	35 gallons per day
for each dry cow	15 gallons per day
for each steer, horse	12 gallons per day
for each hog	4 gallons per day
for each sheep	2 gallons per day
for each 100 chickens	6 gallons per day
for each 100 turkeys	12 gallons per day

Note: – table modified from F. R. Hore, Farm Water Supply, Ontario Department of Agriculture and Food, Publication 476

For information on irrigation requirements, contact your Regional Office of the Ontario Ministry of Agriculture and Food.

EVALUATION OF PROSPECTIVE WELL SITES

By using the maps in this publication along with the following step-by-step procedure, prospective well sites can be evaluated in terms of probable yields, likely depths to water-bearing zones, and likely quality of water at each site. Subsequently, this information can be used in other considerations such as; possible water treatment, pump type and size, well cost, and type of well construction (a table illustrating the different types of well construction and their applications is appended).

The maps should be used in the suggested sequence in order to obtain the most economic wells. Map 3135-1 indicates yields from the shallowest formations and should be consulted first. Progressively deeper and more costly wells will have to be constructed as water is sought from deeper formations in order to obtain the yields indicated on maps 3135-3 and 3135-5.

Evaluation Procedure

To evaluate yields:

1. locate the well site on Map 3135-1 of Sheet 1 (Yields from Shallow Overburden);
2. note the colour of the map at the well site;
3. refer to the legend and relate the colour to the appropriate probable yield;
4. if the probable yield does not meet your water requirements, repeat steps one through three using Map 3135-3 on Sheet 2 (Yields from Deep Overburden). Similarly, if probable yields determined from Map 3135-3 are insufficient, repeat the same steps using Map 3135-5 on Sheet 3 (Yields from Bedrock).

To evaluate the depths to water-bearing zones:

5. If Map 3135-1 was selected in the above steps, water-bearing zones occur at depths easily reached by shallow dug and bored wells and sand points; if Map 3135-3 was selected, locate the well site on Map 3135-4 and note the depth to the water-bearing zones by using the legend; if Map 3135-5 was selected, locate the well site on Map 3135-6 and note the depths to the water-bearing zones by using the legend;
6. exact depths to water-bearing zones for individual wells are shown on maps 3135-1, 3135-3 and 3135-5.

To evaluate water quality:

7. to evaluate the likely ground-water quality at a potential well site, locate the well on the selected yield map and note the nearby ground-water sampling points. Chemical analyses of these samples are found in the Inorganic Chemical Analyses tables 1, 2, and 3 on Sheet 4. To interpret the significance of the analyses, refer to Table 4 on Sheet 4.

A COMPARISON OF DIFFERENT WELL TYPES AND THEIR APPLICATIONS

WELL TYPE	SUITABLE GEOLOGIC MATERIALS	ADVANTAGES	DISADVANTAGES
DUG WELLS	OVERBURDEN both low- and high-yielding materials (gravel, sand, silt, clay)	• Does not require special machinery to construct • Large diameter provides reservoir storage; augments low yields • Can be constructed in areas of limited access	• Labour intensive to construct • Depth is limited because of caving • Well failure is common during dry periods because of usually shallow depths
BORED WELLS	OVERBURDEN both low- and high-yielding materials (gravel, sand, silt, clay)	• Efficient method of constructing large-diameter wells • Large diameter provides reservoir storage; augments low yields	• Depth is usually limited because of well-drilling equipment limitations and very hard earth materials
DRILLED WELLS	OVERBURDEN AND BEDROCK moderate to high-yielding materials (sand, gravel, sandstone, limestone)	• Can reach deeper depths than other techniques • Can penetrate bedrock	• Generally small-diameter wells with little reservoir storage capacity
DRIVEN OR JETTED WELLS (Sand Points)	OVERBURDEN moderate to high-yielding materials (sand and gravel)	• Simple installation: can be done by hand or machine • A number of these wells can be hooked into one water-supply system	• Small diameter provides little reservoir storage • Depth is limited; depends on tightness of overburden

YIELDS FROM BEDROCK – SUMMARY

Yields of over 50 gallons per minute to wells in bedrock occur in a few isolated wells penetrating fractured limestone or dolomite at Alliston, east of Bond Head and south of Bradford in the southern part of the map area and north of Singhampton in the northwestern part of the map area. Less fractured limestone and dolomite yield between 10 and 50 gallons per minute at Stayner and Singhampton in the north, as do some highly fractured shales near Tottenham in the southern part of the map area. Yields between 2 and 10 gallons per minute are found in areas of limestone, dolomite and sandstone of the Simcoe Group and the Amabel, Fossil Hill, Manitoulin and Whirlpool formations. Yields of less than 2 gallons per minute are found in most areas underlain by shales of the Cabot Head, Queenston, Georgian Bay and Whitby formations except in the northwestern part of the map area where some of these formations will yield between 2 and 10 gallons per minute.

SOURCES OF INFORMATION

Bond, I. J., and Telford, P. G., 1975: Paleozoic geology of the Bolton area, southern Ontario; Ontario Division of Mines, Map 2338.

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White, O. L., 1967: Bedrock topography of the Bolton area, southern Ontario; Ontario Department of Mines, Preliminary Map P.470, Bedrock Topography Series.

Bedrock-surface elevation derived from water-well records on file with the Ontario Ministry of the Environment up to the end of 1978.

Bedrock topography interpretation by D. Walmsley and M. E. Turner.

Cartography by H. De Souza.

Base maps derived from 1:50 000 map sheets of the National Topographic series.

Ontario
MINISTRY OF THE ENVIRONMENT
Water Resources Branch

COUNTY OF SIMCOE (Southern Portion)

Map 3135

GROUND-WATER PROBABILITY

SHEET 3

WATER SUPPLIES IN BEDROCK

INORGANIC CHEMICAL ANALYSES OF GROUND - WATER SAMPLES

Table 1. Inorganic Chemical Analyses – Shallow Overburden Wells

(sample locations shown on Map 3135–1)

Sample Number	Sampling Date	pH in Lab	Constituents in milligrams per litre (mg/L)										Total Alkalinity (as mg/L $CaCO_3$)	Total Hardness (as mg/L $CaCO_3$)	Total Dissolved Solids (mg/L)	Specific Conductance in Lab (μ mho/cm at 25° C)
			Total Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (as $CaCO_3$)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_2 + NO_3 as N)				
365	5/9/61	7.6	0.16	–	–	–	–	–	–	4	–	–	196	188	–	320
479	–	7.5	2.60	–	–	–	–	–	–	17	–	5.0	193	184	–	–
553	–	7.7	0.25	–	–	–	–	–	–	5	–	0.07	197	314	–	–
1339	25/7/79	7.3	<.05	99	33	11	2.7	324	56	13	0.1	1.6	324	384	480	715
4257	–	7.4	0.19	–	–	–	–	–	–	57	–	0.40	370	472	–	–
4577	–	8.1	0.14	–	–	–	–	–	–	28	–	14.0	183	322	–	–
5230	4/8/66	6.7	0.48	604	–	542	–	–	90	111	–	0.23	496	870	–	–
5282	28/6/77	7.6	0.10	86	20	6	5.1	231	39	13	0.1	8.9	231	296	407	578
5312	28/7/77	7.9	0.60	39	24	13	1.7	219	1	2	0.2	<0.1	219	196	254	390
5805	20/6/79	7.8	0.62	69	28	34	2.1	258	26	33	0.2	8	258	276	360	610
6400	4/7/79	7.8	0.70	60	18	7	1.1	229	7	1	0.1	<0.1	229	222	280	430
6637	28/6/77	8.3	0.15	107	18	3	0.8	224	29	59	0.1	4.2	224	343	473	663
6847	18/7/79	7.5	0.10	90	17	51	2.5	209	52	63	0.3	14	209	292	555	775
8321	28/6/77	8.0	<0.10	83	11	2	0.9	217	28	8	0.1	1.6	217	253	323	471
9609	4/7/79	7.6	0.45	90	5	6	3.8	191	52	9	0.1	0.5	191	244	335	495
9997	8/8/78	7.4	<0.05	117	12	5	1.6	260	67	8	0.1	1.7	260	340	490	590
10548	26/9/78	7.7	–	–	–	–	–	–	38	37	–	3.1	–	332	430	610
10560	8/8/78	7.9	<0.05	69	18	4	1.5	206	42	2	0.1	0.5	206	246	290	445
10563	8/8/78	7.0	0.11	187	14	10	3.6	354	43	25	<0.1	29	354	524	860	960
10564	8/8/78	7.5	<0.05	134	12	4	1.1	254	79	12	<0.1	9.6	254	384	545	690
11986	25/7/79	7.7	0.36	54	15	5	1.8	196	13	<0.1	0.1	0.1	196	196	245	378
12550	18/7/79	7.8	1.21	46	20	14	1.2	222	2	5	0.1	<0.1	222	198	270	414
12634	18/7/79	7.3	<0.05	126	17	7	1.2	317	17	20	<0.1	0.7	317	384	455	700
99990	18/7/79	7.7	<0.05	67	22	3	1.0	227	35	2	0.1	0.1	227	257	295	476

Table 2. Inorganic Chemical Analyses – Deep Overburden Wells

(sample locations shown on Map 3135–3)

Sample Number	Sampling Date	pH in Lab	Constituents in milligrams per litre (mg/L)										Total Alkalinity (as mg/L $CaCO_3$)	Total Hardness (as mg/L $CaCO_3$)	Total Dissolved Solids (mg/L)	Specific Conductance in Lab (μ mho/cm at 25° C)
			Total Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (as $CaCO_3$)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_2 + NO_3 as N)				
94	–	7.5	0.75	–	–	–	–	–	–	36	–	1.25	203	380	–	–
146	18/7/79	7.8	0.14	59	15	2	0.9	161	33	13	0.1	0.6	161	208	260	403
225	–	7.9	0.32	–	–	–	–	–	–	8	–	0.12	213	174	–	–
495	5/12/62	7.6	0.22	–	–	–	–	–	8	549	–	–	112	380	–	–
521	5/12/62	7.7	0.10	–	–	–	–	–	0	394	–	–	108	354	–	–
525	–	7.9	0.48	–	–	–	–	–	–	5	–	0.03	208	106	–	–
535	4/7/79	7.8	0.06	60	12	10	1.1	197	20	2	0.1	0.3	197	200	265	405
1265	25/7/79	7.4	1.18	96	21	6	1.1	269	26	7	0.1	8.6	269	326	425	610
2565	4/7/79	7.8	0.26	34	14	72	8.6	262	1	34	0.4	<0.1	262	142	330	580
3574	18/12/62	7.6	0.00	–	–	–	–	–	72	259	–	–	342	676	–	–
3663	4/7/79	7.2	0.05	157	37	26	6.0	377	99	63	0.1	11	377	544	785	1100
3880	4/7/79	8.4	0.10	9	4	57	0.7	112	<1	36	0.5	<0.1	113	40	210	325
4091	22/6/77	8.3	0.25	115	16	15	1.2	273	50	26	0.1	7.7	273	355	485	685
4200	24/11/66	7.8	2.0	39	29	110	–	–	5	151	–	–	254	220	–	–
4214	14/6/65	7.5	4.3	–	–	–	–	–	–	53	0.2	–	467	378	–	–
4221	14/6/65	7.5	3.5	–	–	–	–	–	–	58	0.2	–	455	390	–	–
4224	7/7/58	7.9	3.4	–	–	–	–	–	–	32	–	–	418	372	–	–
4235	–	7.2	1.43	–	–	–	–	–	–	50	–	0.15	197	84	–	–
4282	–	8.5	0.15	–	–	–	–	–	1	15	–	0.00	274	224	–	–
4287	–	8.3	2.50	–	–	–	–	–	1	18	–	0.91	186	154	–	–
4304	12/10/72	7.9	0.65	28	–	66	–	–	–	–	–	–	–	–	–	–
4363	–	7.8	0.90	–	–	–	–	–	5	2	–	0.33	274	224	–	–
4544	–	7.9	0.63	–	–	–	–	–	–	2	–	0.16	200	190	–	–
4571	–	7.8	2.50	–	–	–	–	–	–	8	–	0.16	253	288	–	–
4828	25/7/79	7.2	0.18	165	22	135	5.5	397	38	225	<.01	21	397	501	1110	1590
4988	25/7/79	7.5	0.11	115	21	48	1.6	195	18	165	<0.1	9.3	195	376	855	985
5125	22/6/77	8.3	0.25	115	16	15	1.2	273	50	26	0.1	7.7	273	355	485	685
5140	22/6/77	8.0	0.50	46	24	11	1.0	236	4	2	0.2	<0.1	236	212	289	409
5179	28/7/77	7.9	1.0	35	21	109	1.5	280	3	80	0.4	<0.1	280	172	482	800
5260	2/8/67	7.2	0.15	–	–	–	–	–	–	353	–	–	422	930	–	–
6282	8/8/78	7.3	<0.05	128	30	22	1.9	294	84	35	0.1	1.4	294	444	750	840
8015	18/7/79	8.1	0.07	21	9	87	1.8	172	4	71	0.4	<0.1	172	87	355	550
8808	18/7/79	7.9	0.78	49	17	16	0.7	225	1	<1	0.1	<0.1	225	192	260	401
8820	4/7/79	7.7	3.8	103	16	9	1.4	246	68	12	0.1	<0.1	246	324	410	590
8987	4/7/79	8.0	.08	64	17	4	1.0	208	18	2	0.1	3.5	208	230	285	440
9071	4/7/79	7.8	1.88	62	8	4	1.3	180	16	1	0.1	<0.1	180	188	235	360
9125	20/11/72	8.0	0.70	145	–	–	–	–	–	2	–	<0.01	202	208	210	368
9913	25/7/79	7.4	<0.5	115	20	6	1.6	275	33	24	<0.1	10	275	372	430	700
11374	4/7/79	7.7	0.98	65	18	6	1.3	227	18	2	0.1	<0.1	227	236	285	450
11430	8/8/78	7.6	<0.05	83	25	4	2.1	261	52	2	0.1	0.3	261	310	460	550
11580	3/9/69	7.0	0.95	144	–	14	2.8	–	–	14	–	–	421	454	–	–
11782	10/8/78	7.8	0.11	73	18	6	1.7	264	41	9	0.1	1.3	264	256	400	460
12583	4/7/79	7.8	0.83	54	17	4	1.4	197	16	<1	0.1	<0.1	197	204	255	390
13012	4/7/79	7.9	1.5	53	20	6	1.4	216	13	2	0.1	<0.1	216	216	265	425
13554	4/7/79	7.9	1.07	44	17	19	1.2	200	2	15	0.2	<0.1	200	180	265	410

Table 3. Inorganic Chemical Analyses – Bedrock Wells

(sample locations shown on Map 3135–5)

Sample Number	Sampling Date	pH in Lab	Constituents in milligrams per litre (mg/L)										Total Alkalinity (as mg/L $CaCO_3$)	Total Hardness (as mg/L $CaCO_3$)	Total Dissolved Solids (mg/L)	Specific Conductance in Lab (μ mho/cm at 25° C)
			Total Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (as $CaCO_3$)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_2 + NO_3 as N)				
422	14/2/65	7.4	1.9	–	–	–	–	–	87	4	–	–	233	312	–	–
2559	20/6/79	7.7	0.19	52	31	13	2.7	244	31	5	0.3	0.5	244	254	305	500
4106	10/8/78	7.8	0.1	73	24	14	1.1	201	55	19	0.1	3.8	201	282	475	530
4232	14/6/65	7.4	26.0	–	–	–	–	–	–	88	0.1	–	658	422	–	–
6822	18/7/79	7.7	0.15	74	19	225	11.1	216	36	350	0.5	1.6	216	264	935	1590
9136	18/7/79	7.9	1.10	35	22	190	8.8	265	6	227	0.7	<0.1	265	180	700	1220
10017	20/6/79	7.9	0.63	37	27	21	2.5	208	3	23	0.2	<0.1	208	202	270	465
10524	20/6/79	7.5	<.05	136	50	110	9.5	342	46	252	0.1	1.9	342	536	1250	2700
12878	18/7/79	8.1	0.28	37	12	285	16.0	129	34	441	0.9	<0.1	129	144	950	1690

Map 3135-8

WATER QUALITY

Scale 1 : 300,000

1 inch equals approximately 4.73 miles

5 0 5 10 Miles

5 0 5 10 15 Kilometres

LEGEND

- 215 — Overburden well with reported salty water; depth to salty water-bearing zone (in feet). In some wells, more than one depth is indicated
- 143 — Overburden well with reported sulphurous water; depth to sulphurous water-bearing zone (in feet). In some wells, more than one depth is indicated
- 19 — Overburden well with reported mineralized water; depth to mineralized water-bearing zone (in feet). In some wells, more than one depth is indicated
- 175 — Bedrock well with reported salty water; depth to salty water-bearing zone (in feet). In some wells, more than one depth is indicated
- 84 — Bedrock well with reported sulphurous water; depth to sulphurous water-bearing zone (in feet). In some wells, more than one depth is indicated
- 102 — Bedrock well with reported mineralized water-bearing zone (in feet). In some wells, more than one depth is indicated

NOTE:
"Sulphurous" water usually denotes the presence of hydrogen sulphide gas; a high concentration of sulphate (SO_4) may also be present

SOURCES OF INFORMATION

Map compilation by M. E. Turner.

Cartography by D. McQuillan and H. De Souza.

Geologic information was derived from water-well records on file with the Ontario Ministry of the Environment up to February, 1978.

Base map was derived from 1:25,000 and 1:50,000 sheets of the National Topographic series.

MOE 2224

DESCRIPTIVE NOTES

The inorganic chemical quality of ground water at locations in the study area can be estimated by inspecting the analyses of nearby ground-water samples. Analyses of the samples are shown in tables 1, 2, and 3; locations of the samples are shown on maps 3135-1, 3135-3, and 3135-5. The samples were taken from selected overburden and bedrock wells and indicate quality of ground water in the common water-bearing zones in different parts of the study area.

Table 4 summarizes water-quality criteria from the publication: "Water Management—Goals, Policies, Objectives, and Implementation Procedures of the Ministry of the Environment, 1978." These criteria are maximum concentrations recommended for drinking water supplies and for agricultural uses. While the criteria generally should be adhered to, slight excesses are usually not harmful. In cases where quality of the water supply is in doubt, local health authorities should be consulted.

WATER QUALITY-SUMMARY

Of the wells sampled in the southern portion of the County of Simcoe, 12 percent have salty water (chloride content over 250 mg/L), 6 percent have high concentrations of nitrate and nitrite. (NO_2 + NO_3 over 10 mg/L), 45 percent have high concentrations of iron (over 0.3 mg/L) and 13 percent have very hard water (over 400 mg/L $CaCO_3$). Most salty (and sulphurous) water wells are those drilled close to or into the shales of the Queenston, Georgian Bay, Whitby and Verulam formations at Collingwood and in the Township of Adjala in the southwestern portion of the map area. High concentrations of iron and calcium carbonate ($CaCO_3$) are found in wells throughout the study area and show no obvious patterns of occurrence.

Table 4. Water Quality Parameters

Substance	Significance	Drinking Water Quality Criteria	Agricultural Water Quality Criteria
Iron	Iron in excessive concentrations will precipitate after exposure to air, which causes turbidity, stains plumbing fixtures, laundry and cooking utensils, and imparts objectionable tastes and colours to foods and drinks.	0.3 mg/L*	not specified
Hardness (Calcium, Magnesium)	Consumes soap before a lather will form. Hard water forms scale in water heaters and pipes. Waters of hardness greater than 180 mg/L are classified as very hard.	not specified	not specified
Sodium, Potassium	Large amounts in combination with chloride give a salty taste. Moderate quantities have little effect on the usefulness of water for most purposes. A high sodium content may limit the use of water for irrigation and in some instances for domestic consumptive uses.	not specified	not specified
Sulphate	In large amounts, sulphate can have laxative effects on unaccustomed users and in combination with other ions, gives a bitter taste to water.	250 mg/L	not specified
Chloride	In large amounts and in combination with sodium, chloride gives water a salty taste and increases the corrosiveness of water.	250 mg/L	not specified
Fluoride	In large amounts, fluoride can disfigure teeth by mottling the enamel. However, in more desirable amounts (1.0 mg/L), fluoride has been found to inhibit tooth decay.	2.4 mg/L	2.0 mg/L
Nitrate	Concentration much greater than the natural regional background may suggest pollution. Waters of high nitrate content cause methemoglobinemia (an often fatal infant disease) and therefore should not be used in infant feeding. Nitrate encourages the growth of algae and other organisms that produce undesirable tastes and odours.	10 mg/L	100 mg/L**
Dissolved Solids	High dissolved solids may often suggest that criteria of one or more substances have been exceeded.	500 mg/L	3000 mg/L

*mg/L = milligrams of substance per litre of water
**nitrate + nitrite

Ontario

MINISTRY OF THE ENVIRONMENT

Water Resources Branch

COUNTY OF SIMCOE (Southern Portion)

Map 3135

GROUND-WATER PROBABILITY

SHEET 4

GROUND-WATER QUALITY

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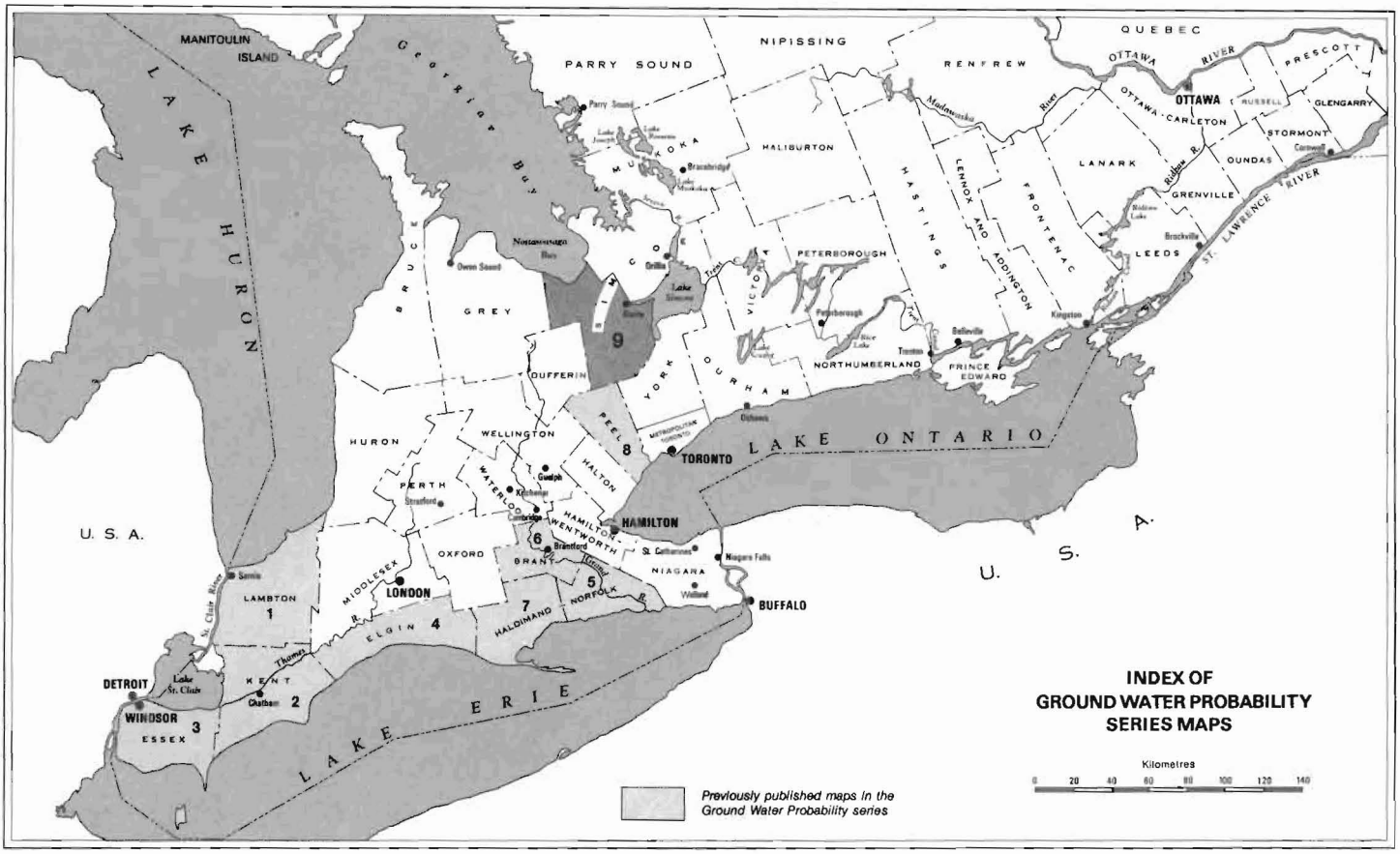
Water Resources Map 3135 - County of Simcoe (Southern Portion)



GROUND WATER PROBABILITY SERIES

1	*Map 3118–1	County of Lambton	1969
2	*Map 3117–1	County of Kent	1970
3	*Map 3107–1	County of Essex	1971
4	*Map 3106	County of Elgin	1972
5	*Map 3112	County of Haldimand	1974
6	*Map 3100	County of Brant	1977
7	Map 3124	Region of Haldimand/Norfolk (Western Portion)	1978
8	Map 3128	Region of Peel	1979
9	**Map 3135**	**County of Simcoe (Southern Portion)**	**1981**

*out of print